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Solitude or co-existence – or learning-together-apart with digital dialogic technologies for kids with developmental and attention difficulties

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Abstract

An overall political vision of a prosperous society is one in which everyone has the same access and possibilities of participating in democratic processes, and in which everyone has equal access to the resources, life and learning – a society grasping the potential of diversity. This study reports on research into the impact of digital technological interventions for including kids with attention and developmental dificulties into school class contexts. The paper describes, how the authors have approached the challenge of researching inclusion of kids with attention and developmental deficits for communication, collaboration and knowledge sharing. Some of the questions addressed in the study are: How – and in what sense - may technology and technological interventions be utilised to enhance this approach with our focus learners? In which situations does it occur in the case study? The data analysis assesses the potential of interventions with digital technology for acting as stimulating enzymes for life and learning. On the basis of a thorough discussion of the analysis and findings, the authors assess the degree to which interventions with digital technologies may promote inclusion through stimulating the participation in life and learning of kids with attention and developmental deficits.

1. Introduction

Thinking is learning all over again,
To be attentive. To focus consciousness.
(Camus)

The challenge, imposed by the Danish government in 2012, of including a higher proportion of learners with special educational needs in mainstream schools, represents a complex situation for educators. Many teachers are bewildered in terms of how to meet this increased challenge of inclusion [1, 2]. Generally, they do not find themselves "properly dressed" - educationally or technologically.

In general, teachers are expected to utilize in pedagogically sound ways the affordances of digital technologies in their mainstream teaching. Being confronted with this "double challenge" - on the one hand, understanding the

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specific needs of this special groups of learners, and on the other hand, possessing the pedagogical competence in relation to the affordances of digital technology - causes most educators some degree of frustration. Generally, they do not find themselves "properly dressed", educationally (competence to teach youngsters with special educational needs) and technologically (competence to teach using digital technologies and networks), to assume this challenge.

On the positive note, research on the educational potential and affordances of digital technologies. Sorensen [3, 4, 5, 6] has identified the *communicative affordance* of digital technology and networks as a strong and promising resource for teachers to employ in learning designs, provided the teachers, pedagogically and technologically, are able to utilize it [7]:

Figure 1. Technology support for digital learning [7]

Much research [e.g. 8, 7] points to the potential of digital technologies for supporting some of the ideas of what has been named "21st century learning skills" ("the four C's"):

- Creativity and innovation;
- Critical thinking;
- Communication
- Collaboration.

The perspective of this study recognizes the potential of digital technological inventions to help teachers and learners with special needs to increase the feeling of *presence, participation and achievements* in teaching and learning processes [9] with focus on "Communication" and "Collaboration". These two modes involve a relation to other people and denote the idea that in order for a learning process to be of good *quality*, a learning process should incorporate - and utilize the digital technology to facilitate - these relations to the teacher and to other learners. In other words, the "glue" for these processes, namely *dialogue* and *interaction,* become central to the learning process. The dialogic affordances are prevailing in the set of reasons why digital technologies appear interesting as tools for helping the inclusion of a diversity of learners in mainstream schools. They offer a great potential in the hands of teachers as tools for helping the inclusion in mainstream classrooms of youngsters with developmental difficulties and difficulties in focusing attention [10].

Learners with attention and developmental disorders, such as e.g. Attention Deficit Hyperactivity Disorder (ADHD), Attention Deficit Disorders (ADD) and Autism Spectrum Disorders, are especially challenged, when it comes to *participating in processes of dialoguing and collaboration*. In general, the achievements of this group of learners are marked by low productivity, errors due to lack of procedures and a poor ability to organize [11].

In addition to general learning disabilities, the attention deficit expressed by insufficient memory, poor persistent focus and initiation ability might affect the ability of the focus learners *to participate* and contribute in collaborative knowledge construction and task solving (ibid.). Furthermore, potential hyperactivity and impulsivity may give rise to inappropriate behavior, disturbances and lower tolerance among the focus learners themselves and their peers [12].

In sum, there appears to be an extensive need for developing digitally based pedagogical methods to stimulate focus learners to co-enact,

to dialogue and to collaborate and through these processes learn to fill in the role at school as a significant and valued *peer and participant* in processes of life and learning.

Section 2 of this paper outlines the analytical optic, on which the analysis of this piece of research is resting. Section 3 gives an account of the research design behind the study. It describes, how the authors have approached the challenge of researching the need of the focus group for communication, collaboration and knowledge sharing, and it assesses the potential of digital technology to act as a positive contributor in this respect. While section 4 reports on previous findings, section 5 forms the forum for the actual analysis and the actual insight into data. Section 6 performs a more thorough discussion of the findings, and section 7 forms the forum for the final assessment of the degree to which it appears possible to make conclusions on the basis of these findings.

2. Analytical optic

In the following paragraphs the authors draw the contours of some of the underlying philosophic assumptions and theoretical *concepts of quality*, through which the authors try to capture and discuss the data and findings of this study in view of the challenge of inclusion.

2.1 Developing identities together-apart

In the following paragraphs the authors draw the contours of some of the underlying philosophical assumptions and theoretical *concepts of quality* that form the analytical optic. These assumptions and concepts underpin the ways and visions through which the authors try to capture and discuss the data and findings of this study in view of the challenge of inclusion (section 4).

Any individual human being is unique (an exception) and need space to develop as such. But at the same time, this unique human is preconditioned upon a ying-yang condition of inescapable co-existence or "throwness" [13], in which *relations* with other people (social, communicative and otherwise) come into focus,

in order for a human being to develop harmoniously throughout a lifelong learning process (fig. 2):

Figure 2. The double optic of the ying-yang relationship between "hin enkelte" [14] (individual) and "co-existence" (collaborative) in a learning process

Envisioning focus learners to become included as happy and well-functioning human beings as any world citizen ("dannelse")", the authors find the notion of "hin enkelte" [14] as one fruitful perspective of a focus learner:

[(...) in a certain understanding every human being constitutes an exception, and that it is true that every human being is the universally human and, in addition, an exception" [14]. (Our translation). Thus, a prosperous process of inclusion aligns with the notion of "a genuine learning process", which emphasize genuine learning as something, not only meaningful to the learner, but also true to the learner [15].

This view of a learner (i.e. a participant in a learning community) entails the idea of *identity through participation*. It implies that in every learning act and communication, the individual must arrive at *experiencing him or herself as something unique* - an exception. This means, ultimately, that all individuals are left, with the important task of participating and, thus, working on the creation of their identity in "becoming themselves" in a kind of double optic of the ying-yang relationship between "hin enkelte" [14] (the individual) and "co-existence" (the collaborative) (fig. 2). Such underlying understanding of life and learning has a consequence for the criteria of quality that we

envision, not only for the general learner, but also for our focus learners. Moreover, such understanding also informs and excerpts an impact on the teacher's choices concerning the way in which he/she pedagogically employs digital technologies in processes of learning.

Thus, any pedagogical approach and use of technologies as tools for inclusion must necessarily employ the digital technologies in ways being concerned with personal growth and confirm the value of "hin enkelte" [14]. At the same time, the digital technologies and interventions must be employed to promote a learner empowering experience of inclusion, a feeling of being recognized as a valuable participating and contributing member of a group of peers sharing an inescapable context of mutual collaboration, dialogue and collaborative knowledge building (CKB) - in a spirit and context of "learning together apart"†[16].

A prosperous process of inclusion is concerned with the following three issues, each of which implying certain values and parts of what we shall refer to as "a genuine learning process" [15]:

1. How to become included as a happy and well-functioning human being and empowered world citizen;
2. How to become included through the establishment of opportunity and readiness for learning for learners challenged in a variety of ways; and
3. How to become included in a way that an individual learn and grow in knowledge and insight, in a complex digital 21st century context?

Envisioning our focus learners to become included as happy and well-functioning human beings as any world citizen ("dannelse")", the authors find the notion of "hin enkelte" [14] as a

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† This term was first coined by Dr. Tony Kaye, in Kaye, A. W. (1992). Learning Together Apart. Heidelberg:Springer. The meaning of the term has been slightly altered in the present context to cover the combination of "learning intra-personally" and "learning inter-personally" (with peers).

fruitful perspective capturing the diversity of our focus learners.

At the same time, the digital technologies must be employed to promote a learner experience of inclusion, and a feeling of uniqueness and of being recognized as a valuable member of a group of peers sharing an inescapable context of mutual collaboration, dialogue and collaborative knowledge building (CKB) [5] - in a spirit and context of "learning together apart" [16].

2.2 Cultivating participation and empowerment

Language use and collaborative dialogue (CKB) are widely acknowledged as fruitful pedagogical elements in a prosperous learning process. Both our natural language and any dialogue unfolding around an issue may be viewed as "media" for learning. They underpin the double optic of the ying-yang relationship between "hin enkelte" [14] (individual) and "co-existence" (collaborative) in the learning process. Instead of aiming at making learners reproduce knowledge (traditional pedagogy), the CKB process allows for participation in a continuous "construction of NEW knowledge" [17] through dialectical pending between involvement and reflection [13].

Dialogue is considered vital for *learner empowerment* to be cultivated. Employing dialogue in a learning process is widely recognized as a fruitful method for the individual learner to be joining and participating the choir adding voice to the polyphonic symphony of the classroom [4, 5, 6, 18, 19]. The *teacher is the key and pedagogic architect* of creating the polyphonic classroom [18] and for making diversity and variation resources among students, in the "symphony of learning" unfolding in an including classroom.

To become *included and (co-)exist* in a global world calls for abilities and competencies to respectfully negotiate diversities and invite compromises - competencies to dialogue with others, while respecting the voice and the value of the argument. Thus, while the making ("Bildung") of democratically oriented global

citizens takes its point of departure already in the implementation of educational digital methodology, it plays a significant role in the education and self-understanding of the global citizen, as it promotes ... *learning to dialogue* [20].

Teaching for growth in a digital 21st century context is envisioned to include two overall societal needs related to two overall pedagogical focuses: 1) supporting the *individual aspect of learning,* and 2) supporting the *co-existential aspect of learning*. Thus, teachers' pedagogies, when using digital technologies and technological interventions for inclusion, must include pedagogical methods that support [24]:

(i) development of *an individual learner identity* (i.e. "hin enkelte") initiative and *ownership* of the individual learner

(ii) co-construction of *new and (to the learner) true knowledge* [15]

(iii) *visibility and respect* for *participation/contribution* to the community

(iv) *collaborative knowledge building dialogue (CKB)* [3]

How can technology and technological interventions be utilised to enhance this approach with our focus learners? In which situations does it occur in the case study?

3. Research design

This piece of research is one of the outcomes from a wider research design by [10, 21, 2].

"Ididakt is an iterative and explorative qualitative research project, where data is collected in a real school context. It is a case study in the frame of Action Research (AR) [22] and Educational Design Research (EDR) [23] using a hermeneutical, phenomenological interpretation of data … It is crucial for our data collection, that the unfolding research process goes hand in hand with the involved teachers' work and interventions into the field of study, so the process becomes a learning endeavour in terms of learning how to work with SEN learners and integrating ICT in the classroom" [10, 25].

"Therefore, we designed this study using an AR/EDR approach, where the researchers are included as participants – and professional dialog partners and facilitators of the transformation processes – at the schools involved: 11 schools where 46 teachers in 26 classes have experimented with and examined the impact of including ICT facilitated interventions with more than 500 learners aged 6 to 16 years – including 56 learners with extensive developmental or attention deficit disorders (focus learners). We are studying the problem in its real life context: the mainstream classroom, where the borders between phenomenon and context are unclear. We have collected data from teachers' statements at seminars, in research blogs, from interviews, and from surveys and observations in the classroom, and we analyse and compare the data in a data triangulation" [10].

4. Previous research

Earlier research in the project [10, 21] identified five types of interrelated ICT-based interventions with ICT (Figure 3):
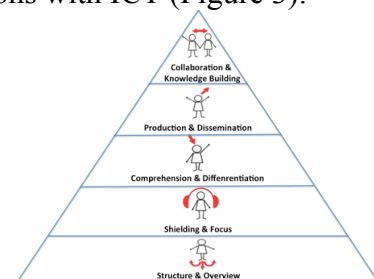
Figure 3. ICT-based interventions scaffolding focus learners to become empowered

These five types of interventions address five areas of functionality, which we asserted needed scaffolding in order for focus learners to become empowered, be able to grow and to participate, socially and academically – and feel included.

We also found that there seems to be an abundance of technologies, which in various ways possess a potential for supporting focus learners in their learning. It was clear, though,

that success will depend on the teacher's capability to utilize 1) the functionality of the technology, and 2) their pedagogical imaginations in terms of employing the tool in the organizational context in question.

To refine such practices an understanding of the "triadic entities, technology, organization and pedagogy, as one holistic phenomenon" [26] is pertinent. In this respect our previous research findings [27] produced an analytic model for a technology's ability to interfere with, innovate and develop new practices. The model aimed at clarifying, how a certain technology's ability to interfere with, innovate and develop new practices will depend on several simultaneous factors: the functionality of the technology, the pedagogical visions by the teachers [25] and the organisational settings, in which the technology is to be implemented [26] (fig. 4):
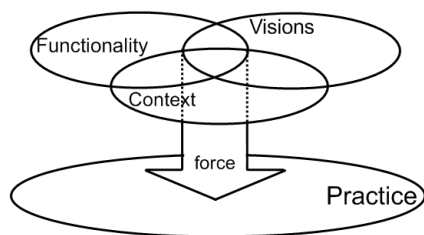

Figure 4. Analytic Model for a technology's ability to interfere with, innovate and develop new practices.

Our previous research [27] indicated that the functionality of the technology at hand, the pedagogical visions and the wider organisational context must be understood as a holistic phenomenon as a basis for assessing the potential of a digital tool for innovating practice.

5. Analysis and findings

During the project work 16 out of 26 classes (62 %) in 8 out of 11 schools (73 %) with Google Apps for Education (GAfE) as Virtual Learning Environment (VLE). We are to some extend able to observe, where and how this technology is utilised to enhance the focus points above, and which impact the use of the VLE has to our

focus learners. As a part of our analysis, the eight schools are divided into three categories compared to the learners' experiences as respectively expert, competent or novice when using the GAfE technology.

The schools have used various technologies for guiding, structuring and facilitating dialogue and collaboration among peers.

Technologies - Overall use:	
Overall VLE with tools for production, mail, calendar, etc.	Google Apps for Education (GAfE), Office 365
Læringsplatforme	Google Classroom, Meebook,
Technologies – Specific use:	
Dialogue	GAfE, Office365, Skype
Networking	Blogs, websites, kalender, Classroom
Production	Google Apps, Office 365, BookCreator, iMovie
Sharing	Showbie, Google Drev, Office Onedrive

Figure 4. Analytic Model for a technology's ability to interfere with, innovate and develop new practices.

Since 73% of the schools (8 out of 11) have used GAfE, we have investigated and compared the use of this App for the purpose of creating a virtual learning environment (VLE) in 62% of the classes (16 out of 26). We can observe how and when this technology is used, but only to a certain extent are we able to assert the effect on this for our focus learners, as the way in which the technology is used varies in many different ways.

Therefore, in order to qualify our analysis, we have grouped the 8 schools in three categories of use:

- Novice (just learning to navigate and work with content)
- Competent (working independently with content as told by the teacher)
- Expert (working independently with digital resources and contribute to content and design)

5.1 The expert level (two classes - 11 % of the schools)

Students at one of the schools mastered GAfE at a high level and employed the VLE in almost all learning activities. Both teachers and learners were experts, when it came to applying the technology. We observed a pedagogically and technologically powerful team of teachers, who in two years had developed a teaching and learning practise for using GAfE as VLE in two classes in level 6th grade. We noticed on-going pedagogical meta-reflections about the value of this technology for focus learners.

The same school utilised Google Websites as a shared digital academic portfolio. Each subject had its own website, and the full academic repertoire over time was compiled here. This was the place where focus learners found texts, tasks set by the teachers, learner assignments, information, analysis models etc. As a main rule, each learner had access to everybody's assignments and notes. The learners had a school account at GAfE containing mailbox, calendar, drive etc., but apart from that they used many online tools (e.g. mindmeister, quizlet, padlet) to complement the Google applications (docs, sheets, slides etc.).

In this pedagogical setting we were witnessing that focus learners were part of a *shared knowledge building* community, where learners were *dialoguing* about academic topics. All learners' *participation and contributions* were *visible and operationalized* in the design at the Google site and the structures at the Google Drive. Learners were *collaborating* in their problem solving; they were inspired of each other's work and discussed possible solutions of their tasks. The Google Site and Drive may be interpreted as reifications of the knowledge they had *jointly* created. It appeared an externalised part of the learners' academic *identity*, and the focus learners expressed *ownership* to their own as well as to the entries of their peers. Furthermore, in addition to this shared open portfolio, each learner had an individual portfolio, where he/she summed up his/her own 'view of the case' – or his/her own "*true knowledge*"; e.g. in math at their 'word of wisdom site' or in linguistics at their 'concept understanding site'.

Focus learners found much help in this pedagogical design. They were supported in *participating* via the *visible* structure, the *jointly generated content* and the *collaboration with peers*. Insecure focus learners retrieved inspiration, certainty and affirmation at the VLE. We observed, how focus learners felt proud of the shared products – even though their participation in the task solving, in fact, had been peripheral. But we observed, too, how the focus learners may feel so vulnerable or have so much to offer in the task solving processes (e.g. due to developmental delay) that it becomes difficult for them to participate, openly and equally.

5.2 The competent level (4 classes - 33% of the schools)

For the students at three schools GAfE is well known, and they use the VLE for many of their learning activities. Both teachers and learners are competent and apply technology fluently. We have observed a team of teachers that – to some degree – mastered the technology and were accustomed to using it with their students in, respectively, two classes in 2nd grade and two classes in 6th grade. We only noticed few pedagogical meta-reflections on the value of this technology for learners with special educational needs.

These schools primarily utilised Google Drive and Google applications as management tool in the learning processes. The teachers established folders for each subject and sub-folders for the topics, in which files related to the task solving were shared. Focus learners received files in writing protected folders and copied them to their own drive. They collaborated on Google

applications (docs, sheets, slides, hangout) during their task solving. One of the schools started using Google Classroom as a compiling VLE.

In this pedagogical setting we noticed that learners had opportunity to *collaborate* and *foster new knowledge*, primarily, through shared writing processes in Google Applications. It happened mostly at task level and in the form of occasionally *shared knowledge building*; only one of the schools attempted to *organize and visualise* the academic content and the learners' contributions in Google Classroom. The *participation* was more individualised, and the *digital dialogue* took place between teacher and each learner, rather than in an open *shared dialogue* among all learners. The *shared writing processes* were aiding focus learners. They were supported in keeping attention and be aware in the task solving process by *dialoguing and collaborating* with peers. Finally, we noticed, how this pedagogical design demanded a clear and visible distribution of roles in the work-sharing processes (as e.g. Collaborative Learning (CL) methods), to avoid focus learners leaving the work to their peers.

5.3 The novice level (10 classes - 56 % of the schools)

GAfE was unknown to the students at the last five schools, but they started using it in the project in some of their learning activities. The learners were novices, while the teachers ranged from novice to expert. There were two different teams of teachers. At one of the schools (three classes in 3rd grade) teachers were experts, given that they had previous experiences with using GAfE as a VLE. At four schools teachers had to pick up digital skills simultaneously to putting the technology in operation in two classes in 1st grade, one class in 4th, two classes in 7th grade and two classes in 10th grade. We noticed incipient pedagogical meta-reflections concerning the value of this technology for learners with special educational needs.

These schools started using Google Drive and Google applications as tools for learning. The teacher gained experiences in creating and sharing folders and stumbled in general over some difficulties related to fostering an appropriate structure for the learners (with the exception of one school). The learners collaborated in Google applications (docs, sheets, slides, calendar) and learned how to use assistive technologies (text to speech) at GAfE. One school tried out Google+ as a social learning environment.

6. Discussion

In this pedagogical setting we noticed how easily focus learners fell short, when the virtual learning environments were lacking intentional management and structure. But at the same time we observed, how teachers at expert level were able to facilitate academic and work-related success for both focus learners and peers, due to the fact that they used their knowledge about GAfE to introduce and scaffold learners in relation to the technology in a well-arranged step-by-step pedagogical approach.

Focus learners need visual support systems to remember how to navigate in a new online universe. It is necessary to produce recognisable structures across subjects and to stimulate focus learners in growing accustomed to the VLE. We have observed, how focus learners' participation in production and dialogue increase considerably, when they are working with digital templates (e.g. Google Docs or Slides), which guide them through the task solving processes.

Insecure focus learners find a lot of help and support to participate from using visible structures, commonly created content and from the collaboration with peers. We observe through interviews with focus learners, how they feel pride in relation to their commonly created products – even if we know from the blog statements of their teachers that their participation and contributions were peripheral. On the other hand, we also observe how focus learners may feel so vulnerable and have so little to contribute with, that it becomes difficult for them to participate, openly and equally.

7. Conclusion

This paper has addressed the impact of digital technology and technological interventions for including kids with attention and developmental deficits into school class contexts. It has described, how the authors have approached the challenge of researching inclusion of kids with attention and developmental deficits for communication, collaboration and knowledge sharing. On the basis of a thorough analysis of the findings, the authors have discussed how technology and technological interventions promote inclusion through stimulating participation, digital dialogue, and collaborative knowledge building of NEW knowledge, primarily through shared writing processes in Virtual Learning Environments.

In view of the increased digitisation of mainstream schools these years (2016), where the up-coming user-portal initiative (BPI) requires that schools buy and use digital platforms, schools and municipalities should make sure that a school practice is born, in which all teachers are competent in using a conscious technology-based pedagogical frame for their classroom activities. A frame, which does not only deal with the distribution of materials and tasks, but which also address the utilization of the potential of the digital tools with respect to further develop the academic and social competences of the learners.

Finally, there is a need for further research in the coupling of schools and digital resources – with specific attention to vulnerable learners, as e.g. learners with developmental and attention difficulties.

The major finding of the study suggests that *teachers and the degree of their pedagogical and technological insights and competences* appear to be the key to inclusion of focus learners. It also uncovers that many teachers need more educational support and competence development. – But to receive more educational support and learning for themselves, they need to be given sufficient space and time to participate and learn together through participating in collaborative knowledge building dialogue. It counts for the learning of the teachers that the quality of their learning process will increase through collaborative knowledge building in a setting of "learning together apart".

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